Appendix 1: Other Composite Sources

Metabiota Composite

The Metabiota composite dataset includes incidence data from 237 countries with subnational data collected for 26 of those as of 23 February 2021. Due to the ongoing nature of the pandemic these statistics may change.

Johns Hopkins University

The COVID-19 Dashboard provided by the Center for Systems Science and Engineering at Johns Hopkins University [link] provides timely information from several aggregated data sources collected using a semi-automated process[20]. The dashboard is particularly effective at capturing the first reported case in a country by monitoring Twitter feeds and online news services[20]. The semi-automated process and use of aggregated sources allows for rapid updates multiple times per day, although the update cadence of the dashboard is unclear. However, as data aggregating sites (e.g. DXY, 1Point3Acres, COVID Tracking Project[20]) do not clearly state the aggregation process, nor the data provenance, it is challenging to troubleshoot data discrepancies. Another limitation is that the site updates as soon as information becomes available which leads to incomplete data at any given time and may result in higher case counts than other sources that have reporting lags due to data cleaning. The dashboard also faces challenges with ambiguous political boundary designation, particularly in the treatment of occupied Palestinian territory which has been its own entry some days and part of Israel on others[35].

The JHU dashboard ensures data permanence by archiving data and freely publishing their methods through GitHub[20]. The dataset available through GitHub includes incidence data from 187 countries (with subnational data available for 22.)

WHO COVID-19 Dashboard

The World Health Organization (WHO) COVID-19 Dashboard [link] provides information collected directly from official communications, unlike other composite sources that rely on third-party data aggregators. The WHO dashboard provides regional epidemic curves, an interactive map, and a downloadable data table with incidence by location over time. Only national data is provided for the 234 countries covered. The dashboard previously provided clear documentation on retrospective data alterations from data cleaning or to rectify errors on a separate webpage, however, this has been replaced by an email address for requesting historic data adjustments [4]. Data is not reported on a consistent cadence; sometimes all locations have current incidence data while other days only about half of the locations have been updated.

The WHO includes disease incidence in the special administrative regions of Macau and Hong Kong as well as Taiwan when reporting on China, while other sources separately report incidence data for these locations.

References

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35 Muhareb R, Giacaman R. Tracking COVID-19 responsibly. *The Lancet* 2020;:S0140673620306930. doi:10.1016/S0140-6736(20)30693-0

36 World Health Organization. WHO Coronavirus Disease (COVID-19) Dashboard. Geneva: World Health Organization 2020. Available online: https://covid19.who.int/info (accessed 20 Jan 2021)

4   WHO. Weekly epidemiological update - 9 February 2021. https://www.who.int/publications/m/item/weekly-epidemiological-update---9-february-2021 (accessed 12 Feb 2021).

Table S1: Metabiota Composite Full Source List

Source	Country Count	Geographic Granularity	Report Frequency	Data Formats	Case/Death Classifications	Source Stopped or Replaced	Report Language	Data is Overridden	Retrospectively Adds/Removes Data	Link
Arizona DOH News Releases	1	AL0, AL1, AL2	sporadic	narrative	confirmed	yes	English	no	no	https://www.azdhs.gov/director/public-information-office/index.php#releases-adhs
Australia DOH Media	1	AL0, AL1, locality	daily	infographic, map, table	confirmed	no	English	yes	no	https://www.health.gov.au/news/health-alerts/novel-coronavirus-2019-ncov-health-alert/coronavirus-covid-19-current-situation-and-case-numbers
Austria Bundesministerium COVID-19	1	AL0, AL1, AL2	daily	table	confirmed	no	German	yes	no	https://www.sozialministerium.at/Informationen-zum-Coronavirus/Neuartiges-Coronavirus-(2019-nCov).html
Bavaria State MOHC Pressemitteilung	1	AL0, AL1, AL2, AL3, locality	sporadic	narrative	confirmed	yes	German	no	no	https://www.stmgp.bayern.de/ministerium/presse/pressemitteilungen/
Belgium MOH 2019-nCoV Latest News	1	AL0, AL1, AL2, locality, sublocality	sporadic	narrative	confirmed	yes	Dutch	no	no	https://www.info-coronavirus.be/nl/news/
Brasil Ministerio de Saude COVID-19	1	AL0, AL1	daily	csv, table	confirmed	no	Portuguese	table: yes; csv: no	yes	https://covid.saude.gov.br/
Brasil Ministerio de Saude Ultimas Noticias	1	AL0, AL1, AL2	sporadic	narrative, table	confirmed	yes	Portuguese	no	no	https://www.gov.br/saude/pt-br
CDC COVID-19	1	AL0, AL1	several times daily	csv, map, table	unspecified, confirmed, probable	no	English	yes	no	https://covid.cdc.gov/covid-data-tracker/#datatracker-home
CDC Newsroom Releases	1	AL0, AL1, AL2, locality	sporadic	narrative	confirmed	yes	English	no	no	https://www.cdc.gov/media/archives.html?Sort=Article%20Date%3A%3Adesc
California DOH COVID-19	1	AL0, AL1	daily	graph, table	confirmed	no	English	no	no	https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/Immunization/nCoV2019.aspx
California DOH Office of Public Affairs News Releases	1	AL0, AL1, AL2	sporadic	narrative	confirmed	yes	English	no	no	https://www.cdph.ca.gov/Programs/OPA/Pages/News-Releases-2021.aspx
Colorado DOH COVID-19	1	AL0, AL1, AL2	daily	table	unspecified	yes	English	yes	no	https://covid19.colorado.gov/data

1

Source	#	AL	Frequency	Format	Case type		Language			URL
Croatia Central Public Health Institute Coronavirus Latest Data	1	AL0, AL1	daily	table	confirmed	yes	Croatian	yes	no	https://www.hzjz.hr/priopcenja-mediji/koronavirus-najnoviji-podatci/
District of Columbia DOH COVID-19	1	AL0, AL1	daily	csv, graph, map, table	confirmed	no	English	no	no	https://coronavirus.dc.gov/data
Finnish IHW Press Releases	1	AL0, AL1, locality	sporadic	narrative	confirmed	yes	English	no	no	https://thl.fi/en/web/thlfi-en/whats-new/press-releases-and-news/press-release
Georgia DOH COVID-19	1	AL0, AL1	daily	map, table	cases: confirmed, deaths: confirmed and probable	no	English	yes	no	https://dph.georgia.gov/covid-19-daily-status-report
HK CHP Local 2019 nCoV SitReps	1	AL0	daily	graph, table	confirmed, probable	yes	English	yes	yes	https://www.coronavirus.gov.hk/eng/index.html
HK CHP Severe Respiratory Disease associated with a Novel Infectious Agent	1	AL0, AL1, locality	daily	table	confirmed	no	English	yes	no	https://www.chp.gov.hk/files/pdf/statistics_of_the_cases_novel_coronavirus_infection_en.pdf
Illinois DPH News Releases	1	AL0, AL1	daily	map, table	confirmed, probable	no	English	yes	no	http://www.dph.illinois.gov/topics-services/diseases-and-conditions/diseases-a-z-list/coronavirus/media-publications/daily-press-briefings
Imperial College London News	6	AL0, AL1, locality	sporadic	narrative	confirmed	yes	English	no	no	https://www.imperial.ac.uk/mrc-global-infectious-disease-analysis/covid-19/
India MOHFW COVID-19	1	AL0, AL1	daily	csv, table	confirmed	no	English	yes	no	https://www.mohfw.gov.in/
Iran MOH Latest News	1	AL0, AL1, AL2, locality	sporadic	narrative	confirmed	yes	Persian	no	no	http://behdasht.gov.ir/index.jsp?siteid=1&fkeyid=&siteid=1&pageid=1508
Ireland DOH COVID-19	1	AL0, AL1	daily	map, narrative, table	confirmed cases, probable deaths, suspected deaths	no	English	no	yes	https://www.gov.ie/en/news/7e0924-latest-updates-on-covid-19-coronavirus/
Israel MOH News and Events	1	AL0	sporadic	narrative	confirmed	yes	Hebrew	no	no	https://www.health.gov.il/NewsAndEvents/SpokemanMesseges/Pages/Messeges.aspx
Italy MOH 2019-nCoV Situation in Italy and the World	1	AL0, AL1, AL2, AL3	daily	infographic, map, table	confirmed	no	Italian	yes	no	http://www.salute.gov.it/portale/nuovocoronavirus/dettaglioContenutiNuovoCoronavirus.jsp?lingua=italiano&id=5351&area=nuovoCoronavirus&menu=vuoto

2

Supplemental material

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Japan MOHLW Press Releases	1	AL0, AL1, locality	daily	narrative, table	confirmed	no	Japanese	no	no	https://www.mhlw.go.jp/stf/houdou/index.html
Korea CDC Press Release	1	AL0, AL1, locality	daily	graph, narrative, table	confirmed	no	Korean	no	no	http://www.kdca.go.kr/board/board.es?mid=a304020000000&bid=0030
Maryland DOH COVID-19	1	AL0, AL1	daily	map, table	cases: confirmed, deaths: confirmed and probable	no	English	yes	no	https://coronavirus.maryland.gov/
Massachusetts DOH COVID-19	1	AL0, AL1	daily	graph, table	confirmed, probable	no	English	yes	no	https://www.mass.gov/info-details/covid-19-response-reporting
Massachusetts DOH Press Releases	1	AL0, AL1, AL2, locality	sporadic	narrative	confirmed, probable	no	English	no	no	https://www.mass.gov/orgs/department-of-public-health/news
Ministry of Health Singapore News Highlights	1	AL0	daily	narrative, table	confirmed	yes	English	dashboard: yes, narrative: no	no	https://www.moh.gov.sg/covid-19
NHFPC Health Emergency Office News	14	AL0, AL1, locality	daily	narrative	confirmed, suspected	no	Chinese	no	no	http://www.nhc.gov.cn/yjb/s7860/new_list.shtml
NYC Health COVID-19	1	AL0, AL1, locality	daily	csv, graph, map, table	confirmed, probable	no	English	yes	no	https://www1.nyc.gov/site/doh/covid/covid-19-data.page
New Jersey DOH COVID-19	1	AL0, AL1	daily	graph, map, table	confirmed, probable	no	English	yes	no	https://www.nj.gov/health/cd/topics/covid2019_dashboard.shtml
New York State DOH COVID-19	1	AL0, AL1, locality	daily	graph, map, table	confirmed	no	English	yes	no	https://covid19tracker.health.ny.gov/views/NYS-COVID19-Tracker/NYSDOHCOVID-19Tracker-Map?%3Aembed=yes&%3Atoolbar=no&%3Atabs=n
Ohio DOH COVID-19	1	AL0, AL1	daily	table	confirmed, probable	no	English	yes	no	https://coronavirus.ohio.gov/wps/portal/gov/covid-19/home
PHAC 2019 Novel Coronavirus Infection	1	AL0, AL1	several times daily	csv, graph, map	confirmed, probable	no	English	yes	yes	https://www.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection.html
Pennsylvania DOH COVID-19	1	AL0, AL1	daily	graph, map, table	cases: confirmed and probable, deaths: unspecified	no	English	yes	no	https://www.health.pa.gov/topics/disease/coronavirus/Pages/Cases.aspx
Philippines MOH Updates on 2019-NCOV	1	AL0, AL1, AL2,	daily	narrative, table	confirmed	yes	English	dashboard: yes,	no	https://doh.gov.ph/covid19tracker

3

Source	#	AL levels	Frequency	Format	Case type		Language			URL
		locality, sublocality						narrative: no		
Robert Koch Institute COVID-19	1	AL0, AL1, AL2, AL3	daily	graph, table	confirmed	no	German	yes	no	https://www.rki.de/DE/Content/InfAZ/N/Neuartiges_Coronavirus/Fallzahlen.html
Rospotrebnadzor News	1	AL0, AL1, locality	daily	narrative	confirmed	yes	Russian	no	no	https://www.rospotrebnadzor.ru/about/info/news/
Sante publique France Actualites	8	AL0, AL1, AL2, locality	daily	csv, table	confirmed	no	French	table: yes; csv: no	no	https://www.santepubliquefrance.fr/dossiers/coronavirus-covid-19/coronavirus-chiffres-cles-et-evolution-de-la-covid-19-en-france-et-dans-le-monde
Spain MSCBS Alerts	1	AL0, AL1, AL2, locality	daily (not weekends)	table	confirmed	no	Spanish	no	yes	https://www.mscbs.gob.es/profesionales/saludPublica/ccaves/alertasActual/nCov/situacionActual.htm
Sri Lanka MOH Coronavirus 2020	1	AL0, AL1, AL2	daily	graph, narrative, table	confirmed	yes	English, Sinhala	no	no	http://www.epid.gov.lk/web/index.php?option=com_content&view=article&id=225&lang=en
Sweden Folkhalsomyndigheten Utbrott	1	AL0, AL1, locality	daily (not weekends)	csv, graph, table	confirmed	no	Swedish	yes	yes	https://www.folkhalsomyndigheten.se/smittskydd-beredskap/utbrott/aktuella-utbrott/covid-19/statistik-och-analyser/bekraftade-fall-i-sverige/
Switzerland BAG New coronavirus	2	AL0, AL1	daily (not weekends)	graph, map, narrative, table	confirmed	no	German	yes	no	https://www.bag.admin.ch/bag/de/home/krankheiten/ausbrueche-epidemien-pandemien/aktuelle-ausbrueche-epidemien/novel-cov/situation-schweiz-und-international.html
Taiwan CDC Press Releases	1	AL0	sporadic	map, graph, narrative, table	confirmed	yes	English	map, graph, table: yes; narrative: no	no	https://www.cdc.gov.tw/En
Texas DOH News Updates	1	AL0, AL1	daily	csv, map, table	cases: confirmed and probable, deaths: unspecified	no	English	yes	no	https://www.dshs.texas.gov/news/updates.shtm#coronavirus
Thailand MOPH News for the Masses	1	AL0, AL1, AL2	sporadic	narrative	confirmed	yes	Thai	no	no	https://pr.moph.go.th/?url=pr/index/2/04
UK Government News and Communication	1	AL0, AL1, AL2	daily	csv, graph, narrative, table	confirmed	no	English	some tables, graphs: yes; some	yes	https://coronavirus.data.gov.uk/

4

								tables, csv: no		
US Department of State Media Note	1	AL0	sporadic	narrative	confirmed	yes	English	no	no	https://www.state.gov/press-releases/
USAFacts State Totals	1	AL0, AL1	daily	csv, graph, map	confirmed, probable	yes	English	yes	yes	https://usafacts.org/issues/coronavirus/
Vietnam MOH Hot News	1	AL0, AL1	sporadic	narrative	confirmed	yes	Vietnamese	no	no	https://www.moh.gov.vn/web/guest/tin-noi-bat/-/asset_publisher/hwUjUacn23Hf/content/hai-ca-duong-tinh-ncov-ang-ieu-tri-tai-bv-cho-ray
Virginia DOH COVID-19	1	AL0, AL1	daily	csv, map, table	confirmed, probable	no	English	yes	no	https://www.vdh.virginia.gov/coronavirus/
Washington State DOH COVID-19	1	AL0, AL1	daily (not Sundays)	graph, map, table	cases: confirmed and probable, deaths: unspecified	no	English	yes	no	https://www.doh.wa.gov/Emergencies/NovelCoronavirusOutbreak2020COVID19/DataDashboard
Washington State DOH News Releases	1	AL0, AL1, AL2	sporadic	narrative	confirmed	yes	English	no	no	https://www.doh.wa.gov/newsroom
WHO COVID-19 Overview	234	AL0	several times daily	csv, graph, map	confirmed	no	English	yes	yes	https://covid19.who.int/
WHO DON	6	AL0, AL1, locality	sporadic	narrative	confirmed	yes	English	no	no	https://www.who.int/csr/don/en/
WHO Egypt Media	1	AL0	sporadic	narrative	confirmed	yes	Arabic	no	no	https://twitter.com/WHOEgypt
WHO EMRO News	1	AL0	sporadic	narrative	confirmed	yes	English	no	no	http://www.emro.who.int/media/news/index.html
WHO EMRO Weekly Epidemiological Monitor	1	AL0	weekly	narrative, table	confirmed	yes	English	no	no	http://www.emro.who.int/pandemic-epidemic-diseases/information-resources/weekly-epidemiological-monitor.html
WHO News Releases	1	AL0	sporadic	narrative	confirmed	yes	English	no	no	https://www.who.int/news
WHO-India COVID-19 Situation Reports	1	AL0, AL1, AL2	weekly	graph, map, narrative, table	confirmed	yes	English	no	no	https://www.who.int/india/emergencies/coronavirus-disease-(covid-19)/india-situation-report
WHO 2019-nCoV Situation Reports	50	AL0, AL1, locality	weekly	narrative, table, map	confirmed	yes	English	no	no	https://www.who.int/emergencies/diseases/novel-coronavirus-2019/situation-reports
Wisconsin DHS News Releases	1	AL0, AL1	sporadic	narrative	confirmed	yes	English	no	no	https://www.dhs.wisconsin.gov/news/index.htm

5

Wuhan Municipal Health Commission Public announcements	3	AL0, AL1, locality	daily	narrative	confirmed	yes	Chinese	no	no	http://wjw.wuhan.gov.cn/

Key

Source: name of source as recorded in Metabiota's dataset.

Country Count: number of countries coded in Metabiota's dataset from each source.

Geographic Granularity: administrative division level (AL or Admin) as provided by each source. Available administrative division levels for any source may change over time.

Report Frequency: cadence at which each source updates available data. Publication frequency for any source may change over time.

Data Formats: format of publicly available data provided by each source. Available formats for any source may change over time.

Case/Death Classifications: confirmation status of cases and/or deaths as presented in each source. Provided classifications in any source may change over time.

Source Stopped or Replaced: reflects whether a source ceased providing data or Metabiota ended data collection in favor of an alternate source.

Report Language: original publication language of each source.

Data is Overwritten: reflects whether a source overwrites previously provided data with each update. Archival practices for any source may change over time.

Retrospectively Adds/Removes Data: reflects whether a source adjusts previously reported data based on ongoing surveillance and testing. Retrospective reporting by any source may change over time.

Link: public URL for each source. URL for any source may change over time

6